AMENDED CLAIMS

1. (Currently amended) A method for separating a plurality of co-channel, interfering signals of interest received by antennas of an antenna array without any a priori knowledge of the signals, the method comprising the steps of:

(a) forming a matrix in eigenspace based on samples of the signals received by each of the antennas of the antenna array, the matrix yielding an eigenstream for each signal of interest;

(b) processing the eigenstreams for each signal of interest from step (a) to determine ~~a set of optimal~~ eigenweights for each signal of interest;

(c) processing each of the sets of eigenweights and their associated eigenstream determined in step (b) by performing on each eigenstream time domain processing followed by performing frequency domain processing to determine revised eigenweights for each signal of interest;

(d) comparing the eigenweights determined in step (b) to the revised eigenweights determined in step (c) for each eigenstream to determine the difference between them;

(e) repeating steps (b), (c) and (d) for the eigenstream for a signal of interest only if the eigenweight difference determined in step (d) for the last mentioned eigenstream exceeds a predetermined value, and using the revised eigenweights from step (c) as the preliminary eigenweights in step (b) when steps (b), (c) and (d) are repeated;

~~(c)~~ (f) converting the ~~optimal~~ revised eigenweights for each signal of interest from step (c) to beam forming weights for each of the signals of interest when it is determined in step (e) that the eigenweight difference does not exceed the predetermined value; and

~~(d)~~ (g) processing a copy of the received signals using the beam forming weights produced in step (f) for each signal of interest ~~co-channel, interfering signal~~ to extract each signal of interest from the received, interfering signals.

2. (Currently amended) The method in accordance with claim 1 wherein step (b) comprises the steps of:

~~(e)~~ (h) determining the number of interfering signals of interest from the matrix; and

~~(f)~~ (i) establishing preliminary eigenweights for each signal eigenstream;

~~(g) processing each of the eigenstreams and their eigenweights to produce revised eigenweights for each eigenstream;~~

~~(h) comparing the preliminary eigenweights to the revised eigenweights for each eigenstream to determine the differences between them;~~

~~(i) repeating steps (g) and (g) only if the eigenweight differences exceed a predetermined value, and using the revised eigenweights from step (g) as the preliminary eigenweights when steps (g) and (h) are repeated;~~

3. (Currently amended) The method in accordance with claim [~~2~~] 1 wherein the frequency processing in step ~~(g)~~ (c) utilizes fast Fourier transforms. ~~comprises the steps of:~~

~~(j) performing time domain processing on the eigenstreams; and~~

~~(k) performing frequency domain processing on the eigenstreams.~~

4. (Currently amended) The method in accordance with claim ~~[3]~~ 2 further comprising the step of:

~~(l)~~ (j) orthogonalizing each of the processed eigenstreams after they have been processed in (c) ~~steps (j) and (k)~~.

5. (Currently amended) The method in accordance with claim 4 wherein there is a beam forming network for each signal of interest to be separated from other interfering signals, each such network has a weighting circuit associated with each of the antennas of the array of antennas, the signals from each of the array of antennas are input to the associated one of weighting circuits in each of the networks, and wherein step ~~(d)~~ (g) comprises the steps of:

~~(m)~~ (k) weighting the antenna signal input to each weighting circuit by the beam forming weights determined in step ~~(e)~~ (f) for the signal of interest; and

~~(n)~~ (l) summing the weighted antenna signals output from the weighting circuits in each network to separate the signal of interest.

6. (Currently amended) The method in accordance with claim 5 further comprising the step of:

~~(o)~~ (m) determining the direction from which each signal of interest is being received by the antennas of the antenna array using the beam forming weights determined in step ~~(e)~~ (f).

7. (Original) The method in accordance with claim 6 wherein a correlation interferometer direction finding algorithm is used to determine the direction from which each signal of interest is being received.

8. (Currently amended) The method in accordance with claim 6 wherein either the time domain processing or the frequency domain processing performed in step (c) ~~step (j) or (k)~~ may be eliminated when there is a priori knowledge of a received signal being a constant modulus or non-constant modulus signal.

9. (Currently amended) The method in accordance with claim 5 wherein step (a) comprises the steps of:

~~(p)~~ (m) forming a covariance matrix using samples of the signals received by each of the antennas of the antenna array; and

~~(q)~~ (n) transforming the covariance matrix into the matrix in eigenspace to produce an eigenstream for each received signal of interest.

10. (Currently amended) The method in accordance with claim 9 wherein the covariance matrix created in step ~~(p)~~ (m) is transformed in step ~~(q)~~ (n) into a matrix in eigenspace to produce a time domain eigenstream for each received signal of interest, and each eigenstream is defined by a steered eigenvector that is equal in length to the covariance matrix integration period.

11. (Currently amended) The method in accordance with claim 9 wherein step ~~(q)~~ (n) is performed using a conventional Hermitian matrix decomposition technique.

12. (Currently amended) The method in accordance with claim 1 wherein step (b) comprises the steps of:

~~(r)~~ (h) performing time domain processing on the eigenstreams; and

~~(s)~~ (i) performing frequency domain processing on the eigenstreams.

13. (Currently amended) The method in accordance with claim 12 further comprising the step of:

~~(t)~~ (j) orthogonalizing each of the processed eigenstreams after they have been processed in steps ~~(r)~~ (h) and ~~(s)~~ (i).

14. (Currently amended) The method in accordance with claim 13 wherein there is a beam forming network for each signal of interest to be separated from other interfering signals, each such network has a weighting circuit associated with each of the antennas of the array of antennas, the signals from each of the array of antennas are input to the associated one of weighting circuits in each of the networks, and wherein step (d) comprises the steps of:

~~(u)~~ (k) weighting the antenna signal input to each weighting circuit by the beam forming weights determined in step ~~(e)~~ (f) for the signal of interest; and

~~(v)~~ (l) summing the weighted antenna signals output from the weighting circuits in each network to separate the signal of interest.

15. (Currently amended) The method in accordance with claim 14 further comprising the step of:

~~(w)~~ (m) determining the direction from which each signal of interest is being received by the antennas of the antenna array using the beam forming weights determined in step ~~(e)~~ (f).

16. (Currently amended) The method in accordance with claim 1 wherein step (a) comprises the steps of:

~~(x)~~ (h) forming a covariance matrix using samples of the signals received by each of the antennas of the antenna array; and

~~(y)~~ (i) transforming the covariance matrix into the matrix in eigenspace to produce an eigenstream for each received signal of interest.

17. (Currently amended) The method in accordance with claim 16 wherein step ~~(y)~~ (i) performed using a conventional Hermitian matrix decomposition technique.

18. (Currently amended) The method in accordance with claim 12 wherein either step ~~(r)~~ (h) or ~~(s)~~ (i) may be eliminated when there is a priori knowledge of a received signal being a constant modulus or non-constant modulus signal.

19. (Currently amended) The method in accordance with claim 1 wherein there is a beam forming network for each signal of interest to be separated from other interfering signals, each

such network has a weighting circuit associated with each of the antennas of the array of antennas, the signals from each of the array of antennas are input to the associated one of weighting circuits in each of the networks, and wherein step ~~(d)~~ (g) comprises the steps of:

~~(z1)~~ (h) weighting the antenna signal input to each weighting circuit by the beam forming weights determined in step ~~(e)~~ (f) for the signal of interest; and

~~(z2)~~ (i) summing the weighted antenna signals output from the weighting circuits in each network to separate the signal of interest.

20. (Currently amended) The method in accordance with claim 19 further comprising the step of:

~~(o1)~~ (j) determining the direction from which each signal of interest is being received by the antennas of the antenna array using the beam forming weights determined in step ~~(e)~~ (f) .

21. (Currently amended) The method in accordance with claim 1 wherein the beam forming weights determined in step ~~(e)~~ (f) can be used for extended periods of time and only need to be updated on an intermittent basis.

22. (Currently amended) The method in accordance with claim 2 wherein the beam forming weights determined in step ~~(e)~~ (f) can be used for extended periods of time and only need to be updated on an intermittent basis.

23. (Currently amended) The method in accordance with claim 5 wherein the beam forming weights determined in step ~~(e)~~ (f) can be used for extended periods of time and only need to be updated on an intermittent basis.

24. (Currently amended) The method in accordance with claim 15 wherein the beam forming weights determined in step ~~(e)~~ (f) can be used for extended periods of time and only need to be updated on an intermittent basis.

25. (Currently amended) A computer readable medium containing executable program instructions for separating a plurality of co-channel, interfering signals of interest received by antennas of an antenna array without any a priori knowledge of the signals, the executable program instructions comprising instructions for:

(a) forming a matrix in eigenspace based on samples of the signals received by each of the antennas of the antenna array, the matrix yielding a eigenstream for each signal of interest;

(b) processing the eigenstreams for each signal of interest from step (a) to determine ~~a set of optimal~~ eigenweights for each signal of interest;

(c) processing each of the sets of eigenweights and their associated eigenstream determined in step (b) by performing on each eigenstream time domain processing followed by performing fast Fourier transform frequency domain processing to determine revised eigenweights for each signal of interest;

(d) comparing the eigenweights determined in step (b) to the revised eigenweights determined in step (c) for each eigenstream to determine the difference between them;

(e) repeating steps (b), (c) and (d) for the eigenstream for a signal of interest only if the eigenweight difference determined in step (d) for the last mentioned eigenstream exceeds a predetermined value, and using the revised eigenweights from step (c) as the preliminary eigenweights in step (b) when steps (b), (c) and (d) are repeated;

~~(c)~~ (f) converting the ~~optimal~~ revised eigenweights for each signal of interest from step (c) to beam forming weights for each of the signals of interest when it is determined in step (e) that the eigenweight difference does not exceed the predetermined value; and

~~(c)~~ (f) converting the ~~optimal~~ revised eigenweights for each signal of interest from step (c) to beam forming weights for each of the signals of interest when it is determined in step (e) that the eigenweight difference does not exceed the predetermined value; and

~~(d)~~ (g) processing a copy of the received signals using the beam forming weights produced in step (f) for each signal of interest ~~co-channel, interfering signal~~ to extract each signal of interest from the received, interfering signals.

26. (Currently amended) The computer readable medium in accordance with claim 25 wherein instruction (b) comprises instructions for:

(e) determining the number of interfering signals of interest from the matrix; and

(f) establishing preliminary eigenweights for each signal eigenstream;

~~(g) processing each of the eigenstreams and their eigenweights to produce revised eigenweights for each eigenstream;~~

~~(h) comparing the preliminary eigenweights to the revised eigenweights for each eigenstream to determine the differences between them;~~

~~(i) repeating steps (g) and (g) only if the eigenweight differences exceed a predetermined value, and using the revised eigenweights from step (g) as the preliminary eigenweights when steps (g) and (h) are repeated;~~

27. (Cancelled)

28. (Cancelled)

29. (Currently amended) The computer readable medium in accordance with claim ~~28~~ 25 wherein there is a beam forming network for each signal of interest to be separated from other interfering signals, each such network has a weighting circuit associated with each of the antennas of the array of antennas, the signals from each of the array of antennas are input to the associated one of weighting circuits in each of the networks, and wherein instruction ~~(d)~~ (g) comprises instructions for:

~~(m)~~ (h) weighting the antenna signal input to each weighting circuit by the beam forming weights determined in step ~~(e)~~ (f) for the signal of interest; and

~~(n)~~ (i) summing the weighted antenna signals output from the weighting circuits in each network to separate the signal of interest.

30. (Currently amended) The computer readable medium in accordance with claim 29 wherein the beam forming weights determined in instruction ~~(e)~~ (f) can be used for extended periods of time and only need to be updated on an intermittent basis.

31. (Cancelled)
32. (Cancelled)
33. (Cancelled)
34. (Cancelled)

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